THE EARLY OCULAR SIGNS OF DEMENTIA PARALYTICA.

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There is no dearth of statistics in regard to the ocular signs of paresis. Many of the reports, however, are open to criticism in two respects: first, because patients in different stages of paresis have been included, so that late as well as early conditions are put in the same category; and second, because frequently no effort has been made to exclude cases complicated with tabes, so that the pupillary, muscular and optic-nerve symptoms of tabes are added to the eye symptoms properly belonging to paresis.

It has, therefore, seemed to me worth while to keep notes of the eye conditions found in a series of cases of paresis uncomplicated with tabes (*i.e.*, having exaggerated knee-jerks) examined at the Manhattan State Hospital within a short time after their admission. These patients were thus seen fairly early in the disease, yet all had been under observation long enough to rule out alcoholic pseudoparesis and to permit an absolute diagnosis of paresis to be made.

In the subjoined table are recorded the ocular conditions of seventy paretics in an early stage of the disease, showing how far pupillary disturbances may be of value in diagnosis.

The method of examination employed is the following: The patient is seated eight feet from a single window with a dark shade drawn over the upper sash. A north window furnishes the most constant light, and there should be no other source of illumination in the room. The patient should face this window squarely, otherwise the more strongly illuminated pupil may contract more than the other, because the consensual reaction is not always equal to the direct. After he has looked out of the window for a minute or two the patient is directed to look up at the ceiling. Since less light then enters his eyes, his pupils dilate. Even with sluggish pupils the light reaction is well made out when the eyes are directed alternately from window to ceiling after remaining a minute in each position. But if the pupils are very sluggish, perhaps the best means of eliciting the light reaction is to have the patient first face the window and then turn his back to it. This is done with both eyes open and then with each eye closed.

The advantage of examining the pupils with the gaze directed toward the ceiling is that the reflex from the cornea does not lie over the pupil and obscure it. Any irregularities in shape can then be made out, and it is easy to measure the size of the pupils. While the patient is looking up the consensual and direct reactions of each pupil may be obtained by covering and exposing each eye singly, with the other eye first open and then covered. With sluggish direct action we may expect sluggish consensual reaction, but rarely a loss of consensual reaction, as is sometimes stated.

In the subjoined table *each pupil has been measured* with the pupillometer *while the other eye was covered*, thus excluding any consensual contraction. Hence, many of the figures are larger than if the pupils had been measured, as they often are, with both eyes exposed.

In order to elicit the sensory reaction the skin of the neck is pinched several times in rapid succession, or the thumb nail is drawn sharply across the temple several times, when each pupil should dilate slightly. There are some sources of error in making this test. It has been advised to have the patient fix the observer's eye while the test is being made. The reaction so obtained is often well-marked, but one cannot be sure that the dilatation is not due to a relaxing of the accommodation due to distraction of the attention when the skin is irritated. Personally, I prefer to make the test with the patient looking at a point on the ceiling. After the gaze has been directed upward a few seconds a spontaneous dilatation of the pupil often occurs, or there may be a continued oscillation or hippus, and this is particularly frequent in paretics. Hence the pupils should be watched until they are entirely at rest before the test is attempted, or better, the irritation of the skin may be continued for 20 or 30 seconds, and when the irritation is stopped the pupils will be seen to contract if sensory dilatation has occurred during the irritation.

Physiological variations of the pupils must be taken into account. Other things being equal, the pupils are somewhat larger in blue eyes than in brown. They are often quite large when the patient is myopic and small when he is hyperopic, because the myope accommodates little and the hyperope accommodates excessively. Age and hardness of the vessels also have their influence. In childhood the pupils are large, in early adult life medium-sized, and in middle age smaller. Thus, in a series of normal eyes in persons between 25 and 35 years of age the pupils measured with one eye closed ranged from 4.5 to 6 mm., the average being 5.25 mm., and in a series between the ages of 40 and 50 the range was from 3 to 4.5 mm., the average being 3.75 mm.

The sensory reflex is usually well-marked in early life, but in middle age it is slight, and in older persons it is often absolutely wanting.

The shape also varies with age. In early life the pupil is round, but in middle age some irregularity of the pupils can usually be made out if the ophthalmoscope is used or the irregularity may be sufficiently pronounced to be seen with the naked eye.

Inequality of the pupils is too common to have much pathological significance. An excitation of the cervical sympathetic will cause a dilatation of the pupil on the same side, which may last a few minutes, or days, or even years. Similarly, a contraction of one pupil may be brought about by a spastic contraction of the sphincter pupillæ. Considerable attention has been paid recently to alternating or see-saw mydriasis (Springende Pupillen, Mydriase à bascule), which is seen in paresis as well as in other affections of the nervous system. In these cases the relative size of the pupils may change even in the course of the examination, and with the alterations in the size of the pupils there may be alterations in the sensory and light reactions. Hence, repeated examinations are desirable, for in paresis particularly the condition of the pupils sometimes differs noticeably from day to day.

In the subjoined table the refraction, as determined by retinoscopy, is recorded in dioptries, E. indicating emmetropia, H. hyperopia and M. myopia. The refractive error was sufficient to account for any diminution that existed in acuteness of vision, except in two cases in which there was disseminated choroiditis. In one other case there was slight blurring and pallor of the disc without diminution of vision, and in another case there was a posterior synechia.

The interior of the eyes was normal except in these four cases, in which doubtless we had to do with the residua of syphilitic inflammations.

It is frequently stated that optic-nerve atrophy is present in a considerable percentage of cases of paresis, at least in the late stages of the disease. Among these 70 patients there was no case of optic-nerve atrophy, and among some hundreds of patients examined at various stages I have rarely found pallor of the optic discs except when symptoms of tabes or of nicotine poisoning existed.

SUMMARY.—The *shape* of the pupils was perceptibly *irregular* in 51 patients, or 70 per cent., an abnormally high percentage considering the ages of the patients.

Inequality of the pupils was found in 32 patients, or 45 per cent.

The *sensory* pupillary reflex was absent in 61 patients, or 87 per cent., a very high percentage considering the ages of the patients.

The *direct light reaction* was perceptibly *sluggish* in one or usually both eyes in 15 patients, or 21 per cent.

The *direct light reaction* was entirely *wanting* in one or usually both eyes in 20 patients, or 28 per cent.

The *convergence reaction* was sluggish in 6 patients, or 9 per cent., in all of whom the light reaction was sluggish or wanting.

The *size* of the pupils ranged from 1.5 to 5mm., and in 37 patients, or 55 per cent., one or both pupils were *smaller* than the average size for the patient's age and refraction.

As a rule, with Argyll-Robertson pupils the sensory reflex is wanting, and there is spastic myosis, the pupils being small; but as the paresis or tabes causing the Argyll-Robertson pupils progresses the spasm of the sphincter pupillæ relaxes and the pupil becomes large, and the convergence reaction becomes sluggish or disappears. In this series among the 20 cases in which the light reaction was lost, in 7 cases one or both pupils were

4 mm. or more in diameter, but it is likely that they had been small earlier in the disease.

In a certain number of cases of paresis the pupils remain normal in every respect up to a late stage of the disease. And it should be said also that in alcoholic pseudoparesis we may find all the pupillary changes found in true paresis, so that the examination of the eyes may not help one in distinguishing between true and pseudoparesis.

RECAPITULATION —As this table shows, in true, uncomplicated paresis there is early in the disease almost constant absence of the sensory reflex, in half the cases irregularity of the pupils, in nearly half inequality of the pupils, in more than half abnormally small pupils, in a fifth of the cases loss of light reaction, in another fifth marked sluggishness of light reaction, and in a few of those with diminished light reaction a diminution of convergence reaction also.

While, as stated above, absence of the sensory reflex, myosis and irregularity of the pupils may not be of much significance in persons past middle life, they are of considerable diagnostic importance when they occur in earlier life; and Argyll-Robertson pupils are, of course, of great significance whatever the patient's age may be.

In conclusion I wish to express my thanks to Dr. E. C. Dent, Superintendent of the Manhattan State Hospital, and to many other medical officers of the institution for affording me every facility and assistance in making these examinations.

					Pupils.					
						Size, mm.		Reflexes.		
Sex.	Age.	Vision.	Refraction.	Fundi.	Shape.	R.	L.	Sensory.	Light.	Convergence.
F.	37	20-20 each	E.	Normal	Irreg.	4.5	4.	Present	Good	Good
F.	36	20-20 each	E.	normal	irreg.	3.	3.	absent	sluggish	good
F.	41	20-20 each	R. H2, L. H3D	normal	round	4.	4.5	absent	good	good
F.	36	R. 20-40, L. 20-50	M. Ast.	normal	irreg.	3.5	3.5	absent	sluggish	good
F.	39	R. 20-30, L. 20-20	H2D	normal	irreg.	2.5	2.	absent	absent	good
F.	54	20-20 each	E.	normal	irreg.	1.5	1.5	absent	absent	good
F.	25	20-20 each	H1.5D	normal	round	5.	5.	absent	sluggish	good
F.	52	20-30 each	E.	normal	round	2.5	3.	absent	absent	good
F.	35	20-20 each	E.	normal	irreg.	3.	3.5	absent	R. good, L. sluggish	good
F.	38	R. 20-200, L. 20-70	H7D	normal	irreg.	3.	2.75	absent	sluggish	good
F.	32	20-20 each	H1.5D	normal	irreg.	3.	3.5	absent	good	good
F.	49	R. 3-200, L. 20-200	H.	choroiditis	round	3.	3.	present	good	good
F.	24	20-20 each	H1.5D	normal	irreg.	4.5	4.5	absent	sluggish	good
F.	45	20-20 each	H1D	normal	irreg.	2.75	3.	absent	sluggish	good
F.	47	R. 20-70, L. 20-200	R. H1D, L. H & Ast.	normal	irreg	2.75	3.	absent	sluggish	sluggish
F.	42	20-70 each	H2D	normal	irreg.	2.5	2.5	absent	absent	good
F.	32	20-30 each	H.Ast.	normal	irreg.	5.	5.	absent	good	good
F.	29	20-20 each	H1.5D	normal	irreg.	3.	3.	absent	absent	good
F.	41	20-20 each	E.	normal	round	4.5	4.5	absent	good	good
F.	37	20-20 each	H1.5D	normal	irreg	3.5	3.	absent	good	good
F.	36	20-20 each	E.	normal	irreg	3.	3.5	present	good	good
F.	46	R. 20-50, L. 20-70	H.Ast.	normal	round	2.5	2.5	absent	absent	good
F.	36		Mix.Ast.	chloroiditis	round	4.5	4.	absent	absent	good
F.	45	20-40 each	H2D	normal	irreg.	4.	3.5	absent	good	good
F.	28	20-20 each	E.	normal	irreg.	4.	4.	absent	good	good
F.	37	20-30 each	H.Ast.	normal	irreg.	2.5	2.5	absent	absent	good
F.	46	20-20 each	H1D	normal	irreg.	3.	3.5	absent	good	good
F.	25	20-30 each	H1.5D	normal	round	3.5	3.5	absent	good	good

F.	42	20-50 each	H2D	normal	irreg.	3.5	3.5	absent	good	good
F.	37	R. 20-40, L. 20-50	R.H2D, L.H2 & Ast.	normal	irreg.	4.	4.5	absent	good	good
F.	40	20-70 each	H2.5D	normal	round	4.	4.	present	good	good
F.	43	20-20 each	H1D	normal	round	5.5	5.5	present	good	good
F.	34	20-20 each	H2D	normal	irreg.	posterior synechia	4.5	absent	good	good
F.	42	20-20 each	H1D	discs pale & blurred	irreg.	3.5	3.5	absent	good	good
F.	40	20-20 each	H2D	normal	irreg.	4.	4.5	absent	sluggish	good
F.	37	20-20 each	E.	normal	round	4.	4.	present	good	good
F.	40	20-20 each	E.	normal	round	4.	4.	?	good	good
F.	35	20-20 each	H1D	normal	irreg.	1.5	2.5	absent	absent	good
M.	55	R. 20-50, L. 20-50	R. H1D, L. H. Ast.	normal	irreg.	5.	3.	absent	sluggish	sluggish
M.	29	20-20 each	E.	normal	round	5.	5.	absent	good	good
M.	45	20-70 each	M2.5D	normal	irreg.	2.	2.5	absent	absent	good
M.	43	20-30 each	H2D	normal	irreg.	3.5	3.5	absent	good	good
M.	40	20-20 each	E.	normal	irreg.	3.5	4.	absent	absent	good
M.	32	20-20 each	E.	normal	round	4.	4.	present	good	good
M.	24	20-20 each	H1D	normal	irreg.	3.	3.	absent	good	good
M.	42	20-30 each	E.	normal	irreg.	4.	4.	absent	good	good
M.	42	20-20 each	H1D	normal	irreg.	3.5	3.5	present	good	good
M.	33	R. 20-30, L. 20-20	E.	normal	irreg.	4.5	3.5	absent	good	good
M.	24	20-20 each	E.	normal	irreg.	4.	4.	absent	absent	good
M.	58	R. 20-50, L. 20-70	H1.5D	normal	irreg.	1.5	2.	absent	absent	good
M.	26	20-20 each	H1D	normal	irreg.	4.5	4.	absent	absent	good
M.	41	20-20 each	H1D	normal	irreg.	4.5	3.	absent	absent	good
M.	27	R. 20-70, L. 20-20	R. H.Ast.	normal	round	3.5	3.5	absent	sluggish	good
M.	29	20-20 each	E.	normal	round	5.	5.	absent	good	good
M.	45	20-20 each	E.	normal	irreg.	4.	3.5	absent	good	good
M.	55	R. 20-100, L. 20-20	R. Ast., L. H1D	normal	irreg.	3.5	3.5	absent	slugggish	sluggish
M.	42	R. 20-20, L. 20-40	E.	normal	irreg.	4.	4.	absent	sluggish	good
M.	35	20-20 each	E.	normal	irreg	3.5	3.5	absent	good	good
M.	27	20-20 each	E.	normal	irreg	3.5	3.5	present	good	good
M.	55	20-70 each	H1D	normal	irreg.	5.	3.	absent	absent	good
M.	39	20-30 each	M.Ast.	normal	irreg	4.	2.5	absent	absent	sluggish

					Pupils.					
						Size, mm.		Reflexes.		
Sex.	Age.	Vision.	Refraction.	Fundi.	Shape.	R.	L.	Sensory.	Light.	Convergence.
M	50	20-20 each	R. E., L. H1.5	normal	irreg.	4.	3.5	absent	sluggish	sluggish
M.	32	20-20 each	E.	normal	round	4.5	4.5	absent	good	good
M.	44	R. 20-40, L. 20-20	R. M1D, L. E.	normal	irreg.	3.5	3.	absent	good	good
M.	43	R. 20-40, L. 20-20	R. H1D, L. E.	normal	irreg	2.5	3.	absent	R.present, L. absent	good
M.	37	20-100 each	H2D	normal	irreg.	3.	3.	absent	good	good
M.	55	20-20 each	E.	normal	round	4.	4.	absent	good	good
M.	45	20-20 each	E.	normal	round	3.	3.5	absent	R. sluggish, L. good	good
M.	42	R. 20-20, L. 20-70	R. E., L. M1D	normal	irreg	3.	3.5	absent	good	good
M.	35	20-20 each	E.	normal	irreg	2.	2.	absent	absent	sluggish